

PROGRESS REPORT: 2009 WESTERN REGIONAL YIELD TRIALS

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Increases in pulse crop production in the Northern Plains continue to warrant expanding efforts in developing new varieties of pulse crops that are particularly adapted to this important production zone. Our breeding program has historically collaborated with scientists from Montana State University and North Dakota State University in the annual evaluation of advanced pea, lentil and chickpea breeding lines at several locations in MT and ND. Selections have also been made from segregating populations and preliminary breeding lines of the USDA-ARS grain legume breeding program based on performance in MT and ND, in order to develop new varieties for the Northern Plains.

In Montana in 2009 advanced yield trials were conducted for lentil at Richland and Moccasin. A total of 33 different lentil varieties and breeding lines were examined at Moccasin, which included entries for Spanish Brown, Eston, Turkish Red and Large Yellow market classes. The overall mean of all entries at Moccasin was 843 lb/acre. The means of individual entries ranged from 505 lb/acre for the Turkish Red line LC01601724T to a high of 1280 lb/acre for the Turkish Red line LC006601550T. The mean yield of check varieties ranged from 689 lb/acre for Eston to 937 lb/acre for CDC Vantage. Among comparisons within market classes between check varieties and breeding lines, the greatest differences were observed for Eston-type entries. The three Eston lines on average outyielded the check variety Eston by 34 %.

A total of 22 different lentil varieties and breeding lines were examined at Richland. The overall mean of all lentil entries at Richland was 1084 lb/acre. The means of individual entries ranged from 692 lb/acre for the Turkish red line LC05600840T to a high of 1568 lb/acre for the Large Yellow variety CDC Richlea. The mean yield of check varieties ranged from 924 lb/acre (Brewer) to 1568 lb/acre (CDC Richlea). Check varieties tended to outyield breeding lines at Richland in 2009.

In North Dakota in 2009 advanced yield trials were conducted for lentil at Minot and Williston. In Minot, a total of 11 Turkish Red and Large Yellow breeding lines and the check varieties Merrit, Riveland, and Crimson were evaluated. The mean of all entries at Minot was 2260 lb/acre while yields of entries ranged from 1836 lb/ac for the Turkish Red line LC05600840T to 2661 lb/acre for the Large Yellow-type line LC01602300R. The highest yielding Turkish Red line, LC06601231T (2519 lb/acre), outyielded Crimson by 31%. The same lines and varieties were also evaluated at Williston. The mean of all entries at Williston was 884 lb/acre while yields of entries ranged from 629 lb/ac for Crimson to 1011 lb/acre for the Turkish Red line LC06601934T, which outyielded Crimson by 61%. At Williston the Turkish Red line LC06601231T outyielded Crimson by 57%.

In 2009 Chickpeas were only evaluated in Moccasin, MT. The overall mean yield of seven Kabuli breeding lines and the variety Dwelley was 806 lb/ac. Yields of entries ranged from 630 lb/acre for the breeding line CA0190B839C to 912 lb/acre for the Spanish White line CA9890233W.

For chickpeas, the overall mean of all entries at Richland was only 291 lb/acre. The means of individual entries ranged from 84 lb/acre (Dwelley) to 633 lb/acre (Sawyer). The means of breeding lines ranged from 150 lb/acre (CA04900843C) to 530 lb/acre (CA04900421C). The overall mean of all entries at Moccasin was 1376 lb/acre. The means of individual entries ranged from 1228 lb/acre (Sierra) to 1500 lb/acre (Dwelley). The means of breeding lines ranged from 1307 lb/acre (CA04900843C) to 1466 lb/acre (CA04900851C).

We anticipate continuing Western Regional Yield Trials in 2011 in collaboration with scientists from Montana State University and North Dakota State University, and our grower cooperators in MT and ND. A broader examination of materials from diverse breeding programs will accelerate the developing of new and improved cool season food legume varieties for pulse-small grain production systems in the Northern Plains.

Lentil variety performance results at Nez Perce (no-till) and Moscow (conventional-till), 2009.

Variety or Selection	Seed Yield			Seed Weight			Plant Height		
	Nezperce	Moscow	Average	Nezperce	Moscow	Average	Nezperce	Moscow	Average
	-----lb/acre-----			-----g/100-----			-----inches-----		
Brewer	312	1748	1030	4.8	5.8	5.3	12	17	15
Eston	457	2300	1379	3.1	3.2	3.1	13	18	16
LC01202307E	776	1572	1174	4.7	3.8	4.3	13	19	16
LC06601231T	521	2065	1293	4.5	4.5	4.5	12	18	15
Pardina	439	2343	1391	3.8	3.7	3.7	11	16	14
LC06601228T	482	2666	1574	4.2	4.6	4.4	11	18	14
LC06601934T	549	2186	1367	4.0	4.4	4.2	13	17	16
LC05600043T	461	2117	1289	4.3	4.3	4.3	13	18	15
Crimson	468	2733	1600	3.6	3.1	3.4	13	16	15
LC05600840T	419	2238	1328	3.8	4.2	4.0	13	17	14
LC01602062T	355	2401	1378	4.0	4.4	4.2	13	15	16
Merritt	449	2159	1304	5.6	6.0	5.8	14	17	17
Riveland	691	2268	1480	6.4	6.8	6.6	14	18	17
Richlea	690	1850	1270	5.3	4.6	5.0	13	21	16
LC01602300R	768	2575	1672	5.0	4.4	4.7	14	19	17
LC06601550T	596	2607	1601	3.7	3.8	3.7	12	18	16
Average	527	2239	1383	4.4	4.5	4.4	13	18	15
LSD (0.10)	206	580	278	0.3	0.3	0.2	1	1	1
CV (%)	28	19	--	4.5	4.7	--	7	7	--

No-till lentil variety performance results at Genesee and Moscow, 2009.

Variety or Selection	Seed Yield			Seed Weight			Plant Height		
	Genesee	Moscow	Average	Genesee	Moscow	Average	Genesee	Moscow	Average
	-----lb/acre-----			-----g/100-----			-----inches-----		
Brewer	739	274	506	5.5	5.0	5.2	14	14	14
Eston	555	379	467	3.1	3.5	3.3	14	14	14
Pardina	920	370	645	3.7	3.6	3.6	12	12	12
Merrit	818	526	672	6.0	5.9	5.9	14	15	14
Riveland	733	466	599	6.6	6.2	6.4	16	15	15
Richlea	787	466	627	4.7	4.7	4.7	15	15	15
Average	759	413	586	4.9	4.8	4.9	14	14	14
LSD (0.10)	187	181	130	0.2	0.3	0.2	1	1	1
CV (%)	20	35	--	3.1	5.7	--	6	6	--

Seed yield and seed weight for no-till lentil varieties tested for three years in northern Idaho.

Variety or Selection	Seed Yield				Seed Weight			
	2007	2008	2009	Average	2007	2008	2009	Average
	-----lb/acre-----				-----g/100-----			
Brewer	1280	932	506	906	5.5	6.6	6.0	6.0
Eston	1210	1007	467	895	3.2	3.5	3.4	3.4
Pardina	1285	988	645	973	3.7	4.0	3.9	3.9
Merrit	1330	1195	672	1066	6.0	7.0	6.5	6.5
Riveland	1375	1147	599	1040	7.0	8.1	7.6	7.6
Richlea	1410	1131	627	1056	5.0	5.4	5.2	5.2
Average	1315	1067	586	989	5.1	5.8	5.4	5.4
LSD (0.10)	NS	179	130	--	0.2	0.1	0.2	--

NS - No Significant Differences

WESTERN REGIONAL LENTIL TRIAL - WREC 2009

REP	PLOT	ENTRY	VARIETY	1ST	1ST	END OF	END OF	FLWR	PLT	PLT	TEST	TEST	PLOT	PLOT	500	1000	SEEDS/
				FLWR	FLWR	FLWR	FLWR										
				FRM 6/1	FRM PLTG	FRM 6/1	FRM PLTG	DAYS	CMS	INCH	GM/QT	LB/B	GRAMS	LB/AC	WT-GMS	WT-GMS	
1	1	1	Crimson	25	51	52	78	27	22	8.7	912.2	64.3	486.8	778.88	18.8	37.6	12063.83
1	2	2	LC01602062T	20	46	51	77	31	26	10.2	904.8	63.8	500.9	801.44	25.16	50.32	9014.309
1	3	3	LC0560840T	22	48	50	76	28	31	12.2	924.4	65.2	742.9	1188.64	25.4	50.8	8929.135
1	4	4	LC06601228T	19	45	50	76	31	26	10.2	925	65.2	635.6	1016.96	27.97	55.94	8108.689
1	5	5	LC06601231T	20	46	51	77	31	26	10.2	923.9	65.1	736.5	1178.4	27.79	55.58	8161.209
1	6	6	LC06601550T	21	47	50	76	29	23	9.1	923	65.1	529.4	847.0401	21.86	43.72	10375.11
1	7	7	LC06601934T	22	48	49	75	27	24	9.4	925.5	65.2	636.4	1018.24	25.08	50.16	9043.062
1	8	8	Merrit	19	45	50	76	31	29	11.4	859.9	60.6	488.6	781.76	38.06	76.12	5959.012
1	9	9	Riveland	21	47	52	78	31	33	13	856.4	60.4	561.2	897.9201	41.37	82.74	5482.234
1	10	10	LC01602300R	23	49	52	78	29	27	10.6	891.9	62.9	746.8	1194.88	26.14	52.28	8676.358
1	11	11	LC03601588R	26	52	50	76	24	32	12.6	900.1	63.4	639.5	1023.2	24.54	49.08	9242.054
1	12	12	LC04600246L	24	50	54	80	30	30	11.8	848.5	59.8	587.2	939.52	33.63	67.26	6743.979
1	13	13	LC04600316R	23	49	53	79	30	31	12.2	888.2	62.6	521.4	834.2401	30.06	60.12	7544.91
1	14	14	LC05600043T	22	48	49	75	27	27	10.6	926	65.3	361.7	578.7201	26.89	53.78	8434.362
2	15	10	LC01602300R	22	48	52	78	30	26	10.2			575.4	920.64			
2	16	7	LC06601934T	21	47	49	75	28	26	10.2			504.5	807.2			
2	17	6	LC06601550T	20	46	49	75	29	24	9.4			504	806.4			
2	18	12	LC04600246L	24	50	56	82	32	27	10.6			499.6	799.36			
2	19	3	LC0560840T	21	47	50	76	29	25	9.8			539.9	863.84			
2	20	2	LC01602062T	20	46	52	78	32	24	9.4			448.2	717.12			
2	21	5	LC06601231T	21	47	51	77	30	24	9.4			472.4	755.84			
2	22	4	LC06601228T	20	46	49	75	29	23	9.1			496	793.6			
2	23	11	LC03601588R	26	52	52	78	26	32	12.6			707.9	1132.64			
2	24	8	Merrit	19	45	50	76	31	27	10.6			655.5	1048.8			
2	25	13	LC04600316R	23	49	52	78	29	30	11.8			661	1057.6			
2	26	14	LC05600043T	21	47	50	76	29	29	11.4			577.1	923.36			
2	27	1	Crimson	25	51	56	82	31	21	8.3			348.3	557.28			
2	28	9	Riveland	22	48	54	80	32	35	13.8			375.1	600.1601			
3	29	14	LC05600043T	23	49	49	75	26	33	13	928.6	65.5	478.2	765.12	26.4	52.8	8590.909
3	30	8	Merrit	20	46	51	77	31	30	11.8	867.4	61.1	597.3	955.68	37.67	75.34	6020.707
3	31	2	LC01602062T	21	47	50	76	29	23	9.1	910.2	64.2	639.7	1023.52	24.66	49.32	9197.08
3	32	6	LC06601550T	21	47	49	75	28	21	8.3	924.3	65.1	592.6	948.16	22.54	45.08	10062.11
3	33	12	LC04600246L	24	50	53	79	29	27	10.6	849.8	59.9	638.2	1021.12	32.84	65.68	6906.212
3	34	4	LC06601228T	21	47	49	75	28	22	8.7	926.3	65.3	342.4	547.84	38.39	76.78	5907.789
3	35	9	Riveland	22	48	55	81	33	31	12.2	858.6	60.5	419.8	671.68	40.85	81.7	5552.02
3	36	10	LC01602300R	23	49	51	77	28	29	11.4	891.9	62.9	693.6	1109.76	26.23	52.46	8646.588
3	37	7	LC06601934T	22	48	49	75	27	26	10.2	928.6	65.5	574	918.4	25.42	50.84	8922.108
3	38	5	LC06601231T	21	47	49	75	28	29	11.4	926.1	65.3	620.8	993.2799	28.36	56.72	7997.179
3	39	13	LC04600316R	22	48	51	77	29	29	11.4	886.2	62.5	608.1	972.9599	29.69	59.38	7638.936
3	40	3	LC0560840T	22	48	50	76	28	22	8.7	925.7	65.2	589.5	943.2	26.16	52.32	8669.724
3	41	1	Crimson	26	52	54	80	28	19	7.5	907	63.9	237.9	380.64	19.08	38.16	11886.79
3	42	11	LC03601588R	26	52	55	81	29	29	11.4	892.7	62.9	587.8	940.48	25.81	51.62	8787.293
4	43	3	LC0560840T	22	48	50	76	28	27	10.6			462.5	740			
4	44	14	LC05600043T	23	49	52	78	29	27	10.6			545.2	872.32			
4	45	7	LC06601934T	22	48	49	75	27	24	9.4			814.5	1303.2			
4	46	8	Merrit	20	46	54	80	34	31	12.2			645.1	1032.16			
4	47	9	Riveland	22	48	54	80	32	30	11.8			597.3	955.68			
4	48	12	LC04600246L	23	49	56	82	33	26	10.2			359.5	575.2			
4	49	13	LC04600316R	23	49	55	81	32	24	9.4			372.6	596.1601			
4	50	2	LC01602062T	22	48	49	75	27	27	10.6			723.6	1157.76			
4	51	1	Crimson	26	52	56	82	30	23	9.1			500.4	800.64			
4	52	4	LC06601228T	21	47	49	75	28	25	9.8			694.4	1111.04			
4	53	6	LC06601550T	22	48	51	77	29	24	9.4			609.7	975.52			
4	54	5	LC06601231T	22	48	52	78	30	32	12.6			632.5	1012			
4	55	10	LC01602300R	25	51	56	82	31	27	10.6			344.8	551.68			
4	56	11	LC03601588R	26	52	55	81	29	28	11			480.2	768.32			

Performance of Lentils in Minot, ND 2009

Entry	Vine Length	Canopy Ht	Pod Ht	Pods/Peduncle	PlntHt Index	Lbs/ac	Test Wt	TSW
LC01602300R	35.75	37.25	18.50	2.3	1.0	2660.5	61.6	6.8
LC04600316R	37.25	33.50	21.25	2.0	0.9	2538.3	61.7	7.3
LC06601231T	30.75	29.50	15.25	2.3	1.0	2518.8	63.1	6.5
LC06601934T	28.50	24.25	12.75	2.0	0.9	2382.3	63.6	4.3
LC06601550T	27.50	28.25	12.25	2.0	1.0	2371.8	63.0	3.3
LC03601588R	36.00	28.50	19.50	2.0	0.8	2358.5	61.7	6.3
LC05600043T	31.75	25.50	15.00	1.5	0.8	2304.8	63.2	5.8
LC06601228T	30.00	27.00	12.50	2.0	0.9	2291.3	63.6	6.3
LC01602062T	28.00	26.75	12.63	2.0	1.0	2282.3	61.8	5.5
MERRIT	31.50	29.50	16.25	2.0	0.9	2241.5	59.8	11.0
RIVELAND	38.00	32.75	22.25	2.0	0.9	2034.8	59.0	12.8
CRIMSON	28.50	25.50	15.25	2.0	0.9	1928.5	62.3	1.8
LC04600246L	36.50	30.75	20.75	2.0	0.8	1892.8	58.2	10.0
LC05600840T	30.50	19.50	11.00	2.0	0.6	1836.0	62.5	5.0
Grand Average	32.18	28.46	16.08	2.0	0.9	2260.1	61.8	6.6

WESTERN REGIONAL LENTIL TRIAL - WREC 2009

REP	PLOT	ENTRY	VARIETY	1ST	1ST	END OF	END OF	FLWR	PLT	PLT	TEST	TEST	PLOT	PLOT	500	1000	SEEDS/
				FLWR	FLWR	FLWR	FLWR										
				DAYS	DAYS	DAYS	DAYS	DAYS	CMS	INCH	GM/QT	LB/B	GRAMS	LB/AC	WT-GMS	WT-GMS	
				FRM 6/1	FRM PLTG	FRM 6/1	FRM PLTG	DAYS									
1	1	1	Crimson	25	51	52	78	27	22	8.7	912.2	64.3	486.8	778.88	18.8	37.6	12063.83
1	2	2	LC01602062T	20	46	51	77	31	26	10.2	904.8	63.8	500.9	801.44	25.16	50.32	9014.309
1	3	3	LC0560840T	22	48	50	76	28	31	12.2	924.4	65.2	742.9	1188.64	25.4	50.8	8929.135
1	4	4	LC06601228T	19	45	50	76	31	26	10.2	925	65.2	635.6	1016.96	27.97	55.94	8108.689
1	5	5	LC06601231T	20	46	51	77	31	26	10.2	923.9	65.1	736.5	1178.4	27.79	55.58	8161.209
1	6	6	LC06601550T	21	47	50	76	29	23	9.1	923	65.1	529.4	847.0401	21.86	43.72	10375.11
1	7	7	LC06601934T	22	48	49	75	27	24	9.4	925.5	65.2	636.4	1018.24	25.08	50.16	9043.062
1	8	8	Merrit	19	45	50	76	31	29	11.4	859.9	60.6	488.6	781.76	38.06	76.12	5959.012
1	9	9	Riveland	21	47	52	78	31	33	13	856.4	60.4	561.2	897.9201	41.37	82.74	5482.234
1	10	10	LC01602300R	23	49	52	78	29	27	10.6	891.9	62.9	746.8	1194.88	26.14	52.28	8676.358
1	11	11	LC03601588R	26	52	50	76	24	32	12.6	900.1	63.4	639.5	1023.2	24.54	49.08	9242.054
1	12	12	LC04600246L	24	50	54	80	30	30	11.8	848.5	59.8	587.2	939.52	33.63	67.26	6743.979
1	13	13	LC04600316R	23	49	53	79	30	31	12.2	888.2	62.6	521.4	834.2401	30.06	60.12	7544.91
1	14	14	LC05600043T	22	48	49	75	27	27	10.6	926	65.3	361.7	578.7201	26.89	53.78	8434.362
2	15	10	LC01602300R	22	48	52	78	30	26	10.2			575.4	920.64			
2	16	7	LC06601934T	21	47	49	75	28	26	10.2			504.5	807.2			
2	17	6	LC06601550T	20	46	49	75	29	24	9.4			504	806.4			
2	18	12	LC04600246L	24	50	56	82	32	27	10.6			499.6	799.36			
2	19	3	LC0560840T	21	47	50	76	29	25	9.8			539.9	863.84			
2	20	2	LC01602062T	20	46	52	78	32	24	9.4			448.2	717.12			
2	21	5	LC06601231T	21	47	51	77	30	24	9.4			472.4	755.84			
2	22	4	LC06601228T	20	46	49	75	29	23	9.1			496	793.6			
2	23	11	LC03601588R	26	52	52	78	26	32	12.6			707.9	1132.64			
2	24	8	Merrit	19	45	50	76	31	27	10.6			655.5	1048.8			
2	25	13	LC04600316R	23	49	52	78	29	30	11.8			661	1057.6			
2	26	14	LC05600043T	21	47	50	76	29	29	11.4			577.1	923.36			
2	27	1	Crimson	25	51	56	82	31	21	8.3			348.3	557.28			
2	28	9	Riveland	22	48	54	80	32	35	13.8			375.1	600.1601			
3	29	14	LC05600043T	23	49	49	75	26	33	13	928.6	65.5	478.2	765.12	26.4	52.8	8590.909
3	30	8	Merrit	20	46	51	77	31	30	11.8	867.4	61.1	597.3	955.68	37.67	75.34	6020.707
3	31	2	LC01602062T	21	47	50	76	29	23	9.1	910.2	64.2	639.7	1023.52	24.66	49.32	9197.08
3	32	6	LC06601550T	21	47	49	75	28	21	8.3	924.3	65.1	592.6	948.16	22.54	45.08	10062.11
3	33	12	LC04600246L	24	50	53	79	29	27	10.6	849.8	59.9	638.2	1021.12	32.84	65.68	6906.212
3	34	4	LC06601228T	21	47	49	75	28	22	8.7	926.3	65.3	342.4	547.84	38.39	76.78	5907.789
3	35	9	Riveland	22	48	55	81	33	31	12.2	858.6	60.5	419.8	671.68	40.85	81.7	5552.02
3	36	10	LC01602300R	23	49	51	77	28	29	11.4	891.9	62.9	693.6	1109.76	26.23	52.46	8646.588
3	37	7	LC06601934T	22	48	49	75	27	26	10.2	928.6	65.5	574	918.4	25.42	50.84	8922.108
3	38	5	LC06601231T	21	47	49	75	28	29	11.4	926.1	65.3	620.8	993.2799	28.36	56.72	7997.179
3	39	13	LC04600316R	22	48	51	77	29	29	11.4	886.2	62.5	608.1	972.9599	29.69	59.38	7638.936
3	40	3	LC0560840T	22	48	50	76	28	22	8.7	925.7	65.2	589.5	943.2	26.16	52.32	8669.724
3	41	1	Crimson	26	52	54	80	28	19	7.5	907	63.9	237.9	380.64	19.08	38.16	11886.79
3	42	11	LC03601588R	26	52	55	81	29	29	11.4	892.7	62.9	587.8	940.48	25.81	51.62	8787.293
4	43	3	LC0560840T	22	48	50	76	28	27	10.6			462.5	740			
4	44	14	LC05600043T	23	49	52	78	29	27	10.6			545.2	872.32			
4	45	7	LC06601934T	22	48	49	75	27	24	9.4			814.5	1303.2			
4	46	8	Merrit	20	46	54	80	34	31	12.2			645.1	1032.16			
4	47	9	Riveland	22	48	54	80	32	30	11.8			597.3	955.68			
4	48	12	LC04600246L	23	49	56	82	33	26	10.2			359.5	575.2			
4	49	13	LC04600316R	23	49	55	81	32	24	9.4			372.6	596.1601			
4	50	2	LC01602062T	22	48	49	75	27	27	10.6			723.6	1157.76			
4	51	1	Crimson	26	52	56	82	30	23	9.1			500.4	800.64			
4	52	4	LC06601228T	21	47	49	75	28	25	9.8			694.4	1111.04			
4	53	6	LC06601550T	22	48	51	77	29	24	9.4			609.7	975.52			
4	54	5	LC06601231T	22	48	52	78	30	32	12.6			632.5	1012			
4	55	10	LC01602300R	25	51	56	82	31	27	10.6			344.8	551.68			
4	56	11	LC03601588R	26	52	55	81	29	28	11			480.2	768.32			

Performance of Lentils in Willston, ND 2009

Entry	Days 1st Flr	Flr Duration	Plnt Ht (cms)	lbs/ac	Test Wt
LC06601934T	75.00	27.25	25.00	1011.76	65.35
LC06601231T	76.75	29.75	27.75	984.88	65.20
LC03601588R	79.00	27.00	30.25	966.16	63.15
Merrit	77.25	31.75	29.25	954.60	60.85
LC01602300R	78.75	29.50	27.25	944.24	62.90
LC0560840T	76.00	28.25	26.25	933.92	65.20
LC01602062T	76.50	29.75	25.00	924.96	64.00
LC06601550T	75.75	28.75	23.00	894.28	65.10
LC06601228T	75.25	29.00	24.00	867.36	65.25
LC04600316R	78.75	30.00	28.50	865.24	62.55
LC04600246L	80.75	31.00	27.50	833.80	59.85
LC05600043T	76.00	27.75	29.00	784.88	65.40
Riveland	79.75	32.00	32.25	781.36	60.45
Crimson	80.50	29.00	21.25	629.36	64.10
Grand Average	77.57	29.34	26.88	884.06	63.53
std	2.32	1.98	3.54	194.32	1.93

Chickpea variety performance results at Moscow, 2009.

Variety or Selection	Seed Yield lb/acre	Seed Weight g/100	Plant Height inches
Dwelley	503	45.8	16
Dylan	278	46.4	14
Myles	619	14.6	14
Sierra	784	41.3	16
Spanish White	243	43.7	14
Troy	278	46.2	13
CA0090B347C	732	34.5	16
CA0469C020C	621	34.7	16
025C	547	34.1	14
007C	342	44.6	14
Average	495	38.6	14
LSD (0.10)	218	2.2	1
CV (%)	37	4.7	4

Seed yield averages for lentil and chickpea varieties tested for three years in northern Idaho.

Variety or Selection	2007	2008	2009	Average
	-----lb/acre-----			
<u>Lentil</u>				
Brewer	1140	981	1030	1050
Eston	1280	1114	1376	1257
Pardina	1330	1094	1391	1272
Crimson	1225	875	1600	1233
Merrit	1235	1131	1304	1223
Riveland	1760	1347	1480	1529
Richlea	1325	1307	1270	1301
LC01202307E	1295	1178	1174	1216
LC01602062T	1445	1276	1378	1366
LC01602300R	1465	1248	1672	1462
Average	1350	1155	1368	1291
LSD (0.10)	70	95	278	--
<u>Chickpea</u>				
Dwellely	1000	1946	503	1150
Dylan	1650	2622	278	1517
Myles	1690	2712	619	1674
Sierra	1460	2878	784	1707
Spanish White	1530	2201	243	1325
Troy	1315	1932	278	1175
CA0090B347C	1725	2909	732	1789
CA0469C020C	1810	2987	621	1806
Average	1523	2523	507	1518
LSD (0.10)	140	365	218	--

Seed yield averages for lentil and chickpea varieties tested for three years in northern Idaho.

Variety or Selection	2007	2008	2009	Average
	-----lb/acre-----			
<u>Lentil</u>				
Brewer	1140	981	1030	1050
Eston	1280	1114	1376	1257
Pardina	1330	1094	1391	1272
Crimson	1225	875	1600	1233
Merrit	1235	1131	1304	1223
Riveland	1760	1347	1480	1529
Richlea	1325	1307	1270	1301
LC01202307E	1295	1178	1174	1216
LC01602062T	1445	1276	1378	1366
LC01602300R	1465	1248	1672	1462
Average	1350	1155	1368	1291
LSD (0.10)	70	95	278	--
<u>Chickpea</u>				
Dwellely	1000	1946	503	1150
Dylan	1650	2622	278	1517
Myles	1690	2712	619	1674
Sierra	1460	2878	784	1707
Spanish White	1530	2201	243	1325
Troy	1315	1932	278	1175
CA0090B347C	1725	2909	732	1789
CA0469C020C	1810	2987	621	1806
Average	1523	2523	507	1518
LSD (0.10)	140	365	218	--

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Spring Legumes

Green dry pea variety performance results at Nez Perce, 2009.

Variety or Selection	Seed Yield lb/acre	Seed Weight g/100	Vine Length inches	Canopy Height inches	Erect Index* 0.0-1.0
Aragorn	1066	18.0	19	18	0.9
Ariel	1114	16.3	19	19	1.0
Banner	1299	17.6	24	23	0.9
Banner NST ⁺	840	17.2	21	19	0.9
Columbian	870	17.7	22	18	0.8
Cruiser	1143	17.2	23	22	0.9
Joel	1228	18.5	26	20	0.8
Karita	1164	20.4	20	20	1.0
Medora	1135	19.7	22	21	1.0
Monarch	1278	16.9	18	15	0.8
Pacifica	1285	20.6	22	20	0.9
Pacifica NST ⁺	1139	20.1	24	23	0.9
Stirling	959	17.8	20	16	0.8
Stirling NST ⁺	741	17.6	18	16	0.9
PS03101445	1200	17.7	21	18	0.9
Pro 081-6118	1027	18.6	21	20	1.0
Average	1093	18.3	21	19	
LSD (0.10)	292	1.1	2	2	0.1
CV (%)	23	4.8	9	10	7.8

+ no seed treatment

* means canopy height/vine length; 1.0 = upright

Green dry pea variety performance results at Moscow, 2009.

Variety or Selection	Seed Yield lb/acre	Seed Weight g/100	Vine Length inches	Canopy Height inches	Erect Index*
Aragorn	2092	20.1	30	30	1.0
Ariel	2422	17.3	28	28	1.0
Banner	2818	19.4	32	28	0.9
Banner NST ⁺	2266	19.0	29	28	1.0
Columbian	1410	18.2	32	15	0.5
Cruiser	2385	19.3	30	28	1.0
Joel	2347	20.2	37	14	0.4
Karita	1953	23.5	27	27	1.0
Medora	2307	19.3	34	34	1.0
Monarch	2161	18.6	23	20	0.9
Pacifica	2265	21.6	28	26	0.9
Pacifica NST ⁺	2465	21.4	28	25	0.9
Stirling	1833	20.1	21	20	1.0
Stirling NST ⁺	2021	19.6	21	21	1.0
PS03101445	2387	18.8	25	25	1.0
Pro 081-6118	2266	19.0	29	29	1.0
Average	2212	19.7	28	25	0.9
LSD (0.10)	350	1.1	4	4	0.1
CV (%)	14	4.7	11	12	8.1

+ no seed treatment

* means canopy height/vine length; 1.0 = upright

Green Dry Pea Variety Performance in Northern Idaho 2009.

Entry	Seed Yield			Seed Weight			Average of 2 sites		Plnt Ht Index
	Nez Perce	Moscow	Average	Nez Perce	Moscow	Average	Vine Length	Canopy Height	
	-----kg/ha-----			-----g/100-----			cm	cm	
Banner	1456	3158	2307	17.6	19.4	18.5	70.3	64.9	0.92
Pacifica NST ⁺	1276	2763	2020	20.1	21.4	20.7	66.2	60.9	0.92
PS03101445	1345	2676	2010	17.7	18.8	18.2	58.3	54.4	0.93
Joel	1376	2631	2004	18.5	20.2	19.3	79.3	42.9	0.54
Pacifica	1441	2538	1989	20.6	21.6	21.1	64.0	57.5	0.90
Ariel	1249	2714	1981	16.3	17.3	16.8	59.9	60.2	1.01
Cruiser	1282	2673	1978	17.2	19.3	18.3	67.9	63.6	0.94
Medora	1272	2586	1929	19.7	19.3	19.5	71.0	70.4	0.99
Monarch	1433	2423	1928	16.9	18.6	17.7	51.7	44.1	0.85
Pro 081-6118	1151	2540	1845	18.6	19.0	18.8	63.2	61.9	0.98
Aragorn	1195	2345	1770	18.0	20.1	19.1	62.7	60.9	0.97
Karita	1304	2189	1746	20.4	23.5	21.9	59.6	59.4	1.00
Banner NST ⁺	942	2540	1741	17.2	19.0	18.1	63.7	59.8	0.94
Stirling	1074	2054	1564	17.8	20.1	18.9	51.2	46.2	0.90
Stirling NST ⁺	830	2265	1548	17.6	19.6	18.6	49.3	47.4	0.96
Columbian	976	1581	1278	17.7	18.2	18.0	68.5	41.0	0.60
Average	1225	2480	1852	18.3	19.7	19.0	62.9	56.0	
LSD (0.10)	328	393	255	1.1	1.1	0.8	2	2	
CV (%)	23	14	--	4.8	4.7	--	--	--	

+ no seed treatment

Yellow dry pea variety performance results at Nez Perce, 2009.

Variety or Selection	Seed Yield lb/acre	Seed Weight g/100	Vine Length inches	Canopy Height inches	Erect Index*
Carousel	1003	20.9	23	22	1.0
Delta	823	17.5	19	19	1.0
Rex	1025	20.0	20	19	0.9
PRL 415	1061	18.5	23	21	0.9
Shawnee	1181	18.6	26	16	0.7
Universal	1101	19.2	21	20	1.0
Pro 083-8709	1103	20.2	23	23	1.0
Pro 083-8718	1071	21.0	23	22	1.0
Pro 083-8739	1312	19.7	23	21	0.9
Average	1075	19.5	22	20	0.9
LSD (0.10)	292	1.1	2	2	0.1
CV (%)	23	4.8	9	10	7.8

* means canopy height/vine length; 1.0 = upright

Yellow dry pea variety performance results at Moscow, 2009.

Variety or Selection	Seed Yield lb/acre	Seed Weight g/100	Vine Length inches	Canopy Height inches	Erect Index*
Carousel	2162	22	29	29	1.0
Delta	2142	21	25	25	1.0
Rex	2158	24	27	24	0.9
PRL 415	2426	20	30	28	0.9
Shawnee	1403	20	32	10	0.3
Universal	2633	22	29	30	1.0
Pro 083-8709	2196	22	27	27	1.0
Pro 083-8718	1869	23	29	29	1.0
Pro 083-8739	2468	22	27	27	1.0
Average	2162	21.8	28	25	0.9
LSD (0.10)	350	1.1	4	4	0.1
CV (%)	14	4.7	11	12	8.1

* means canopy height/vine length; 1.0 = upright

Combined yellow dry pea variety performance data for Nez Perce and Moscow, 2009.

Entry	Seed Yield			Seed Weight			Average of 2 sites	
	Nez Perce	Moscow	Average	Nez Perce	Moscow	Average	Vine Length	Canopy Height
	-----kg/ha-----			-----g/100-----			cm	cm
Pro 083-8739	1470	2766	2118	19.7	21.6	20.7	63.0	60.3
Universal	1234	2951	2093	19.2	22.4	20.8	63.6	64.3
PRL 415	1189	2719	1954	18.5	20.3	19.4	66.7	61.7
Pro 083-8709	1236	2461	1849	20.2	22.2	21.2	63.6	63.5
Rex	1149	2419	1784	20.0	24.1	22.1	60.4	55.0
Carousel	1125	2424	1774	20.9	22.4	21.7	65.1	64.7
Delta	923	2401	1662	17.5	20.8	19.2	55.5	55.4
Pro 083-8718	1200	2094	1647	21.0	22.6	21.8	66.1	65.4
Shawnee	1323	1573	1448	18.6	20.0	19.3	73.8	33.5
Average	1205	2423	1814	19.5	21.8	20.7	64.2	58.2
LSD (0.10)	328	393	255	1.1	1.1	0.8	5.5	2.5
CV (%)	23	14	--	4.8	4.7	--	--	--

Seed yield averages for green and yellow dry pea varieties tested for three years in northern Idaho.

Entry	2007	2008	2009	Average
	-----kg/ha-----			
<u>Green Peas</u>				
Banner	2130	1558	2308	1998
PS03101445	2130	1794	2011	1978
Monarch	2163	1703	1928	1931
Pacifica	1849	1935	1990	1925
Joel	1950	1474	2004	1809
Aragorn	1917	1682	1770	1790
Cruiser	1771	1611	1977	1786
Medora	1726	1582	1929	1746
Stirling	1849	1672	1565	1695
Karita	1805	1520	1746	1690
Stirling NST ⁺	1872	1539	1547	1653
Columbian	1917	1233	1278	1476
Green Average	1923	1609	1838	1790
<u>Yellow Peas</u>				
Universal	2163	1775	2093	2010
Rex	2051	1829	1784	1888
Carousel	1793	1669	1774	1746
Delta	1816	1631	1662	1703
Shawnee	1861	1323	1448	1544
Yellow Average	1937	1645	1752	1778
Overall Average	1927	1619	1813	1806
LSD (0.10)	113.2	184.9	254.4	

2009 Western Regional Spring Lentil and Chickpea Evaluations

Experiments: #86 & 89

C. Chen¹, G. Vandemark², & K. Neill³

OBJECTIVES: The objectives of these trials were to evaluate lentil and chickpea (Garbanzo Bean) selections from the USDA-ARS Grain Legume Genetics and Physiology program in Pullman, Washington, for grain production potential in Central and Northeastern Montana.

METHODS: Two trials were established to evaluate spring lentil and chickpea lines. The trials were conducted at the Central Agricultural Research Center, Montana State University - Montana Agricultural Experiment Stations (MSU-MAES), and in a producer's field south of Richland, Valley County, Montana (Table 1). The 2009 Western Regional Lentil Trial consisted of 33 selections at Moccasin, of which, nine were commercially available varieties (Brewer, CDC Richlea, CDC Vantage, Eston, Merrit, Pennell, Riveland, Pardina, and Crimson). The remaining 24-lines were separated by five "Types" and included three "Richlea-type", two "Eston-type", three "Laird-type", six "Pardina-type", and nine "Turkish Red" or "Crimson-type" (Table 2a). At Richland, the lentil trial was reduced to 22-entries, of which, nine were the same commercial varieties included at Moccasin. The remaining 13 selections were from the USDA-ARS program and were divided into the same 5-classes of lentils. Additionally at Moccasin, the 2009 Western Regional Chickpea Trial was established. The trial consisted of eight entries, of which one (Dwelley) was a commercially available variety, five were Café type Kabuli and two were Spanish White type Kabuli chickpeas (Table 2b). All seed in the trial was pre-treated with fludioxinil and mefenoxam fungicides (Apron MAXX® RTU, Syngenta Crop Protection, Inc) to protect against soil borne seed and seedling diseases. The trials were organized and packaged at CARC in Moccasin. All seed was properly inoculated with the appropriate *Rhizobium* sp. strain prior to seeding. Best management practices were employed using available resources at each site. Important management information, including but not limited to, seeding date, previous crop, crop-year precipitation, etc., are presented in Table 1.

RESULTS: (Note: The following results and summary are for informational purposes only. Inclusion of any commercial variety in this summary does not constitute a recommendation by MSU-MAES or CARC.)

Lentil Grain Yields were adversely affected by herbicide damage at Moccasin, however, the trial did recover from the damage and difference of breeding lines in susceptibility to the herbicide was observed (Table 3). With the exception of line LC05600840T and Pardina, the large green lentils were not as susceptible to sulfentrazone (Spartan) as the other types of lentils (Table 3), having a range in damage from 1.00 to 2.75, however this was not correlated to seed size ($R^2 = 0.15$; data not shown). Although having a higher susceptibility to sulfentrazone (4.12), line LC06601550T recovered and had the highest grain yield of 1,280 pounds per acre (Table 3), but was not statistically greater than LC03600854L, LC04600316R, LC01602300R, and LC04600705L lentils at Moccasin. At Richland, CDC Richlea was the top grain yielder (1568 lbs acre⁻¹), but was not statistically greater than CDC Vantage or LC04600316R lentils (Table 3). **Flowering** dates were recorded at Moccasin only (due to distance from Moccasin to Richland site; Table 4). Due to the variability in herbicide damage, flowering date was difficult to ascertain. However, Line 05600812E appeared to be the first cultivar to reach flowering at Moccasin (not significant). **Plant Heights**, at harvest, were similar at Moccasin and Richland (25.5 and 21.8 cm, respectively; Table 4). However, the tallest lines at Moccasin, (LC03600854L, Riveland, and LC04600316R), were not necessarily the tallest lines at Richland. Again, this is thought to be a result of the stunted growth by the herbicide damage and not necessarily attributed to genetic or environmental response. **Kernel Weight**, measured as test weight, was similar between Moccasin and Richland (61.5 and 60.4 lbs bu⁻¹, respectively). Line LC04600751T had the highest test weight at Moccasin (64.2 lbs bu⁻¹), but was similar to five other lines. This line was not tested at Richland, however, the line with the heaviest test weight at Richland (LC06601550T), was similar to LC04600751T, at Moccasin (Table 4).

Chickpea Grain Yields were agreeable at Moccasin, despite being under re-cropped and sup-bar moisture conditions experienced at this site (Table 5). The trial averaged 805 pounds per acre with the Spanish White line CA8980233W having the highest yield (912.0 lbs acre⁻¹), but was only statistically higher than line CA9990B1579C. **Plant Heights** averaged 31.8 cm, with line CA0190B839C being the

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tallest line evaluated (37.8 cm; **Table 5**). **Test Weight, Kernel Weight and Size**, test weight, 1,000-kernel weight (TKW) and Bean Size (by sieve) were measured. Line CA0090B347C had the highest test weight (57.1 lbs bu⁻¹), but was not statistically heavier than line CA9990B1579C (**Table 5**). Line CA9783163C appeared to have the largest TKW (598.5 g 1,000-kernels⁻¹), but was not statistically larger than the two Spanish Whites and Dwelley (**Table 5**). The Spanish White lines CA9890233W and CA9990187W appeared to have the largest bean sizes (**Table 5**), having 55.8% and 54.8% beans (by weight) larger than 10mm, respectively. However, the Café lines, CA0290B730C and CA9783163 were statistically similar in size (53.5% and 51.3% larger than 10mm, respectively). Line CA0090B347C, although a good yielder, had inferior bean size with only 4.8% and 54.5% larger than 10mm and 9mm, respectively (**Table 5**).

FUTURE PLANS: Future testing of spring lentil, chickpea and dry pea lines from the Grain Legume Genetics and Physiology program at the USDA-ARS Pullman, Washington location will continue at CARC, Moccasin, MT.

TRIAL COLLABORATORS: These pulse crop trials were made possible by the funding support from the U.S.A. Dry Peas, Lentils & Chickpeas Council and Montana Agricultural Experiment Station. As with any trial, many individuals were involved and need to be acknowledged for their help in the successful completion of the 2009 trials. The following list is not inclusive, as there are others who may not be listed but were just as vital in the success of these trials:

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Kelly Arnold, Agricultural Field Technician, CARC, Moccasin, MT
Rebecca McGee, Research Geneticist, USDA-ARS, Grain Leg. Gen. & Phys. Unit, Pullman, WA
Jarrod Pfaff, USDA-ARS, Grain Legume Genetics and Physiology Unit, Pullman, WA
Marvin Tarum (Tarum Farms), Producer, Richland, Valley County, MT
Verlin Koenig, MSU-AES, Valley County Extension Agent-retired, Glasgow, MT
Richard Fulton, Producer, Richland, MT
Steven Miner, Producer, Richland, MT

Table 1. 2009 Western Regional Lentil and Chickpea Trials - Site management summary.
 Montana Agricultural Experiment Stations, Central Ag. Research Center, Moccasin, MT

Field Summary			
	Moccasin		Richland ^{1/}
	Lentil	Chickpea	Lentil
Environment:	Dryland		Dryland
Tillage History:	No-Till		No-Till
Previous Crop:	Winter Wheat		Spr Wht
Soil Type:	Judith C-L		Farnuf Loam
Elevation:	4300'		2950'
Trial Management			
Seeding Date:	04/13/09	05/07/09	05/07/09
Fertilizer:	None		None
Plot Size:	90 ft ²		50 ft ²
Pesticides: (rates)	sulfentrazone (Caused Lentil Injury) (5oz ac ⁻¹) glyphosate (14-16oz/ac) quizalofop (10oz/acre) carbaryl (Sevin) - Pea Leaf Weevil		ethalfluarlin (?) [Farmer applied]
Harvest Date:	8/12-18/09 (as plots ripened)	09/23/09	08/25/09
Crop-Yr Precip:	8.15"	5.52"	9.50"
	4/1 - 7/31	5/7 - 9/23	5/4 - 9/25
Site Ave: (100-yr)	8.89"	10.35"	
	4/1 - 7/31	5/1-9/30	
Observations:	Herbicide Injury		Some Shatter
	Cool-dry May-June		

^{1/} - Richland site was on Marvin Tarum's farm near Richland, Valley County, Montana

Table 2a. 2009 Western Regional Spring Lentil Line Evaluation - Line Characteristics
 - Exp: 860709. Central Agricultural Research Center, Moccasin, Montana

Line	Seed Coat	Cotyledon	Type	Size ^{1/}	Relative Maturity
Eston	Yellow-Green	Yellow	Eston	Small	Early
LC01602307E	Yellow-Green	Yellow	Eston	Small	Moderate
LC05600810E	Yellow-Green	Yellow	Eston	Small	Moderate
LC05600812E	Yellow-Green	Yellow	Eston	Small	Moderate
Pardina	Brown	Yellow	Pardina	Small	Early
LC01602245P	Brown	Yellow	Pardina	Small	Mod-Early
LC02601144P	Brown	Yellow	Pardina	Small	Early
LC03600204P	Brown	Yellow	Pardina	Small	Early
LC03601426P	Brown	Yellow	Pardina	Small	Early
LC04600350P	Brown	Yellow	Pardina	Small	Early
LC05600995P	Brown	Yellow	Pardina	Small	Early
Crimson	Brown	Red/Orange	Crimson	Small	Moderate
LC01601724T	Brown	Red/Orange	Turkish Red	Small	Moderate
LC01602062T	Brown	Red/Orange	Turkish Red	Medium	Early
LC04600751T	Brown	Red/Orange	Turkish Red	Small	Moderate
LC05600043T	Brown	Red/Orange	Turkish Red	Small	Early
LC05600840T	Brown	Red/Orange	Turkish Red	Small	Moderate
LC06601228T	Brown	Red/Orange	Turkish Red	Medium	Moderate
LC06601231T	Brown	Red/Orange	Turkish Red	Medium	Moderate
LC06601550T	Brown	Red/Orange	Turkish Red	Small	Early
LC06601934T	Brown	Red/Orange	Turkish Red	Medium	Early
CDC Richlea	Yellow-Green	Yellow	Richlea	Medium	Moderate
Brewer	Yellow-Green-Mottled	Yellow	Brewer	Medium	Early
CDC Vantage	Yellow-Green	Yellow	Richlea	Medium	Moderate
LC01602300R	Yellow-Green	Yellow	Richlea	Medium	Moderate
LC03601588R	Yellow-Green	Yellow	Richlea	Medium	Moderate
LC04600316R	Yellow-Green	Yellow	Richlea	Medium	Moderate
Merrit	Yellow-Green	Yellow	Laird	Large	Mod-Early
Pennell	Yellow-Green	Yellow	Laird	Large	Moderate
Riveland	Yellow-Green	Yellow	Laird	V.Large	Moderate
LC03600854L	Yellow-Green	Yellow	Laird	V.Large	Late
LC04600246L	Yellow-Green	Yellow	Laird	V.Large	Late
LC04600705L	Yellow-Green	Yellow	Laird	Large	Late

^{1/} - Size Classes (g/1000 seeds): Large: >60-65; Medium: 50-60; Small <50

2b. 2009 Western Regional Chickpea Selections - Characteristics.
 -Exp: 89. Central Agricultural Reseach Center, Moccasin, Montana

Line	Breeding Company	Type	Size	Leaf
Dwellely	USDA-ARS	Café-Kabuli	Large	Unifoliate
CA9783163C	USDA-ARS	Café-Kabuli	Large	Fern-like
CA9990B1579C	USDA-ARS	Café-Kabuli	Large	Unifoliate
CA0090B347C	USDA-ARS	Café-Kabuli	Large	Unifoliate
CA0190B839C	USDA-ARS	Café-Kabuli	Large	Unifoliate
CA0290B730C	USDA-ARS	Café-Kabuli	Large	Mixed
CA9890233W	USDA-ARS	Spanish White	Large	Fern-like
CA9990I875W	USDA-ARS	Spanish White	Large	Fern-like

Table 3. 2009 Western Regional Lentil Line Evaluations - Agronomic Summary (Yields)
 - Exp: 86. MSU-MAES, Central Ag. Research Center, Moccasin, Montana

Selection	Moccasin, MT			Richland, MT	
	Damage (0 - 5)	Grain Yield (lbs acre ⁻¹)	Moisture (%)	Grain Yield (lbs acre ⁻¹)	Moisture (%)
Brewer	2.50	741	10.2	924	11.6
CDC Richlea	4.75	815	11.4 ^a	1568 ^a	11.5
CDC Vantage	3.50	937	10.2	1413 ^a	10.6
LC01602300R	3.46	1021 ^a	10.7 ^a	1269	11.9 ^a
LC03601588R	4.25	711	11.0 ^a	1155	11.7
LC04600316R	2.00	1057 ^a	10.4	1392 ^a	12.0 ^a
Eston	4.36	689	10.3	1175	11.3
Essex (2307E)	4.00	915	11.0 ^a	1177	12.6 ^a
LC05600810E	3.00	983	10.0	-----	-----
LC05600812E	2.75	880	10.2	-----	-----
Merritt	1.75 ^a	912	10.3	1084	11.7
Pennell	2.25	801	10.4	1114	11.6
Riveland	1.75 ^a	909	10.0	986	10.6
LC03600854L	1.00 ^a	1104 ^a	10.0	-----	-----
LC04600246L	1.79 ^a	844	9.7	931	11.9 ^a
LC04600705L	2.75	1008 ^a	10.0	-----	-----
Pardina	1.75 ^a	817	10.3	1040	11.7
LC01602245P	2.25	951	10.5	941	12.1 ^a
LC02601144P	3.25	895	10.4	-----	-----
LC03600204P	3.12	788	10.9 ^a	-----	-----
LC03601426P	2.45	743	10.0	-----	-----
LC04600350P	3.25	781	11.2 ^a	-----	-----
LC05600995P	2.25	788	10.8 ^a	-----	-----
Crimson	2.79	691	10.6 ^a	1287	11.6
LC01601724T	4.49	505	11.1 ^a	-----	-----
LC01602062T	2.94	749	10.9 ^a	896	10.9
LC04600751T	3.06	632	10.2	-----	-----
LC05600043T	2.43	704	9.8	771	10.4
LC05600840T	0.75 ^a	911	9.4	692	10.4
LC06601228T	3.94	678	9.8	800	11.4
LC06601231T	3.12	866	10.4	1107	11.3
LC06601550T	4.12	1280 ^a	10.4	956	11.4
LC06601934T	3.12	724	10.3	1160	11.1
Trial Means	2.9	843	10.4	1084	11.4
LSD0.05 (by t)	1.2	297	0.9	262	0.8
CV% (s/means)	30.1	25.0	6.0	17.1	5.1
F-Value	5.15	2.12	2.23	5.60	3.86
p-value	0.00	0.00	0.00	0.00	0.00

^a - Denotes values equal to highest value (in **bold**) based on protected LSD at 5% significance level.

^{1/} - Herbiced Damage on scale of 0 (no visible damage) to 5 (severely damaged); taken on 6/25/2009

Table 4. 2009 Western Regional Lentil Trials - Agronomic Summary (Maturity; Height; Test Wt)
 - Exp: 86. MSU-MAES, Central Ag. Research Center, Moccasin, Montana

Selection	Moccasin, MT			Richland, MT	
	Flower date	Height cm	Test Wt lbs bu ⁻¹	Height cm	Test WT lbs bu ⁻¹
Brewer	24-Jun	24.0	58.0	24.3 ^a	58.9
CDC Richlea	27-Jun	24.8	59.6	29.0 ^a	60.1
CDC Vantage	26-Jun	26.8	60.4	29.3 ^a	59.3
LC01602300R	27-Jun	27.9	60.5	27.3 ^a	61.1 ^a
LC03601588R	27-Jun	26.8	60.3	22.0	59.8
LC04600316R	27-Jun	30.0 ^a	59.8	22.0	59.3
Eston	26-Jun	27.8	62.2	20.5	62.3 ^a
Essex (2307E)	28-Jun	27.0	61.7	27.5 ^a	61.4 ^a
LC05600810E	26-Jun	25.0	62.5	----	----
LC05600812E	20-Jun ^{ns}	27.3	62.6	----	----
Merritt	25-Jun	27.3	57.7	26.5 ^a	58.5
Pennell	25-Jun	26.3	57.7	26.5 ^a	58.2
Riveland	25-Jun	30.0 ^a	56.7	25.8 ^a	55.7
LC03600854L	26-Jun	32.0 ^a	56.5	----	----
LC04600246L	28-Jun	25.9	57.5	26.3 ^a	57.8
LC04600705L	25-Jun	28.5	58.2	----	----
Pardina	25-Jun	24.5	63.4	17.0	63.0 ^a
LC01602245P	26-Jun	24.3	63.4	16.5	62.1 ^a
LC02601144P	26-Jun	27.5	62.9	----	----
LC03600204P	25-Jun	23.7	63.7 ^a	----	----
LC03601426P	24-Jun	23.0	63.5	----	----
LC04600350P	25-Jun	21.3	63.5	----	----
LC05600995P	25-Jun	23.0	62.9	----	----
Crimson	27-Jun	23.4	62.8	19.0	62.5 ^a
LC01601724T	25-Jun	18.1	64.1 ^a	----	----
LC01602062T	25-Jun	23.3	60.9	18.3	60.0
LC04600751T	25-Jun	23.2	64.2 ^a	----	----
LC05600043T	24-Jun	23.0	64.0 ^a	14.8	59.7
LC05600840T	24-Jun	24.0	64.0 ^a	14.5	57.2
LC06601228T	26-Jun	23.8	63.1	16.5	62.8 ^a
LC06601231T	26-Jun	26.9	62.7	20.8	63.0 ^a
LC06601550T	24-Jun	24.4	63.7 ^a	19.8	63.8 ^a
LC06601934T	25-Jun	26.5	63.6	16.8	62.5 ^a
Trial Means	25-Jun	25.5	61.5	21.8	60.4
LSD _{0.05} (by t)	ns	3.5	0.6	5.5	2.9
CV% (s/means)	1.3	9.7	0.7	17.8	3.4
F-Value	1.50	5.00	134.5	6.21	4.58
p-value	0.08	0.00	0.00	0.00	0.00

^a - Denotes values equal to highest value (in **bold**) based on protected LSD at 5% significance level.

^{1/} - Herbiced Damage on scale of 0 (no visible damage) to 5 (severely damaged); taken on 6/25/2009

Table 5. 2009 Western Regional Chickpea Trial - Agronomic Summary.
 -Exp 89. MSU-MAES, Central Agricultural Research Center, Moccasin, Montana

Selection	Height cm	Grain Yield lbs acre ⁻¹	Moisture %	Test Wt lbs bu ⁻¹	TKW g 1,000-sds ⁻¹	Bean Size:			
						>10 mm	> 9 mm	> 8 mm	
Dwellely	34.0	891.3 ^a	10.5	55.8	580.8 ^a	36.0	91.5 ^a	99.3 ^a	100
CA9783163C	30.5	843.8 ^a	10.3	54.7	598.5^a	51.3 ^a	93.0 ^a	99.8 ^a	100
CA9990B1579C	32.3	718.3	10.4	56.4 ^a	506.3	19.0	79.5	98.8 ^a	100
CA0090B347C	33.0	904.8 ^a	10.6^{ns}	57.1^a	478.2	4.8	54.5	97.3	100
CA0190B839C	37.8^a	630.0	10.2	55.1	560.9	40.5 ^a	89.3 ^a	98.5 ^a	100
CA0290B730C	30.3	789.5 ^a	10.2	54.1	556.0	53.5 ^a	93.8 ^a	100.0^a	100
CA9890233W	28.3	912.0^a	10.1	53.5	593.8 ^a	55.8^a	93.8 ^a	99.8 ^a	100
CA99901875W	28.8	754.0 ^a	10.2	53.1	589.2 ^a	54.8 ^a	94.3^a	100.0^a	100
Trial Means	31.8	805.4	10.3	55.0	558.0	39.4	86.2	99.2	100
LSD _{0.05} (by t)	2.85	161.7	ns	0.8	26.1	18.4	11.9	1.5	ns
CV% (s/means)	6.1	13.7	3.2	1.0	3.2	31.8	9.4	1.1	0.0
F-Value	10.32	3.37	1.27	23.24	24.5	8.98	11.39	3.30	0.0
p-Value	0.00	0.01	0.31	0.00	0.00	0.00	0.00	0.02	0.0

^a - Denotes values equal to highest value (in **bold**) based on protected LSD at 5% significance level.

^{ns} - Denotes no statistical significance was observed.